

Steller sea lion & Northern fur seal

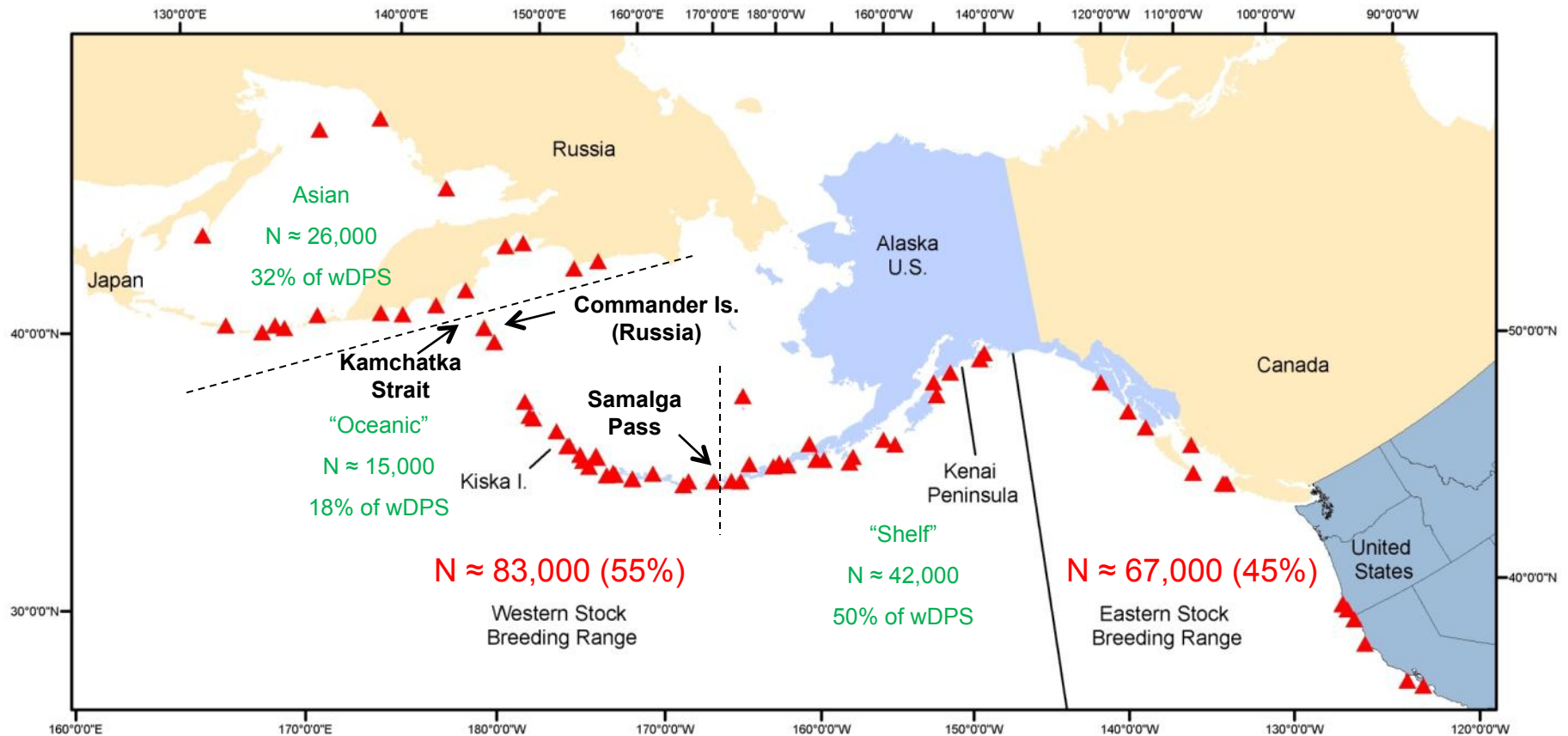
Abundance and Research in Alaska: 2014 update

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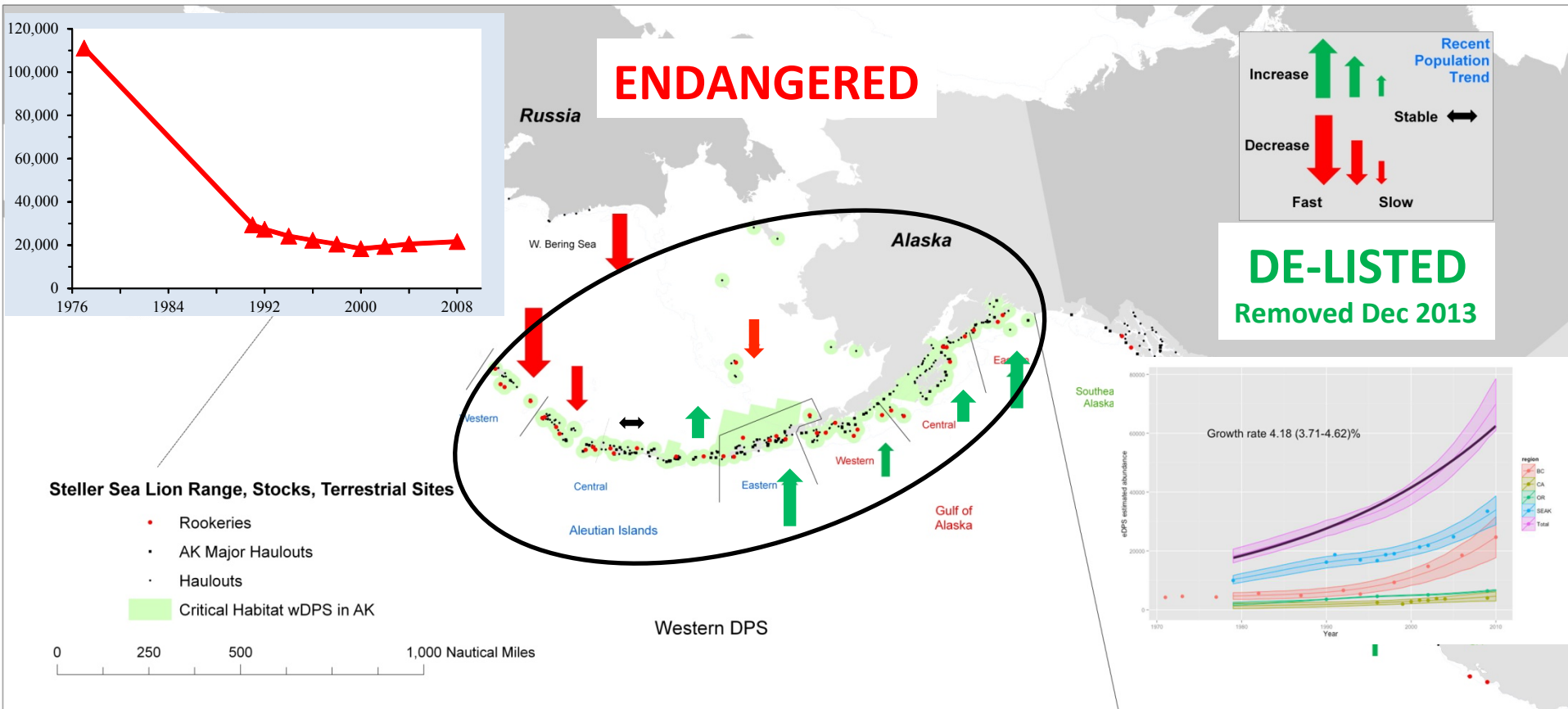


Steller Sea Lion Rookeries, Stock Structure, Current Abundance



- ~150,000 Steller sea lions in North Pacific
- 2 Distinct Population Segments (DPSs or Stocks) - East and West of 144°W
- Sub-structure within western DPS
 - Asia, Pelagic or Oceanic AK, Shelf AK

SSL Range-wide Trends & ESA Status



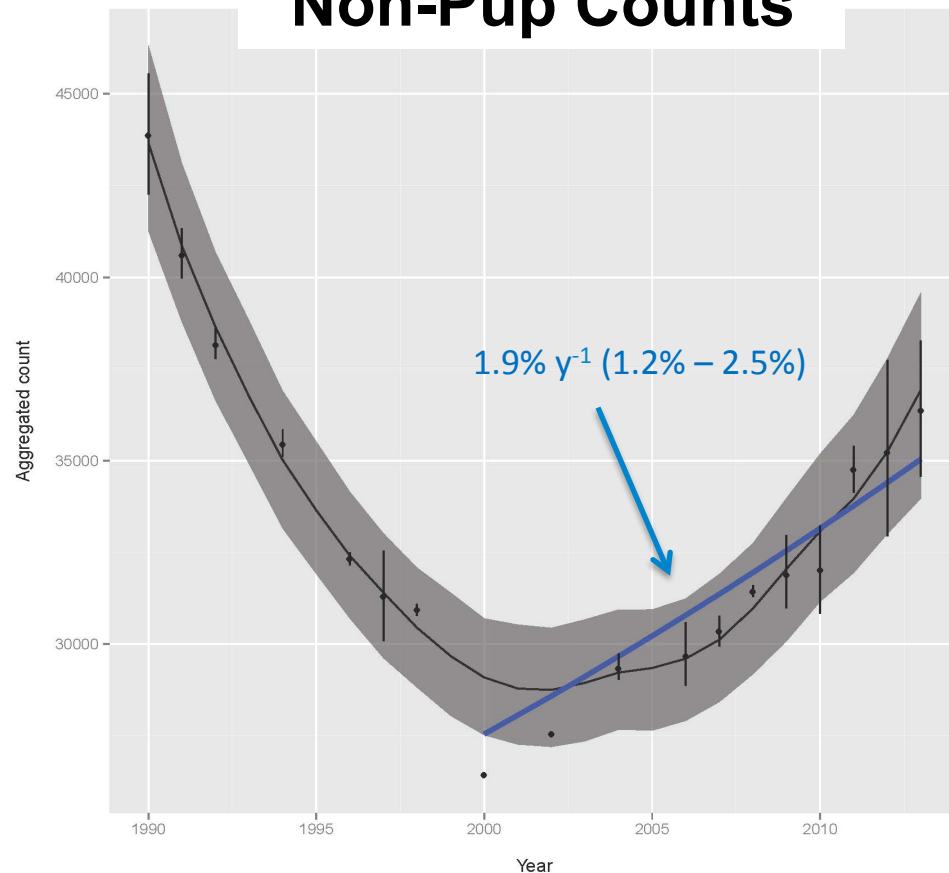
Western DPS ESA Demographic De-Listing Criteria

- AK population would have to grow at 3% per year for 30 years (3 generations)
 - Similar to eastern DPS
- 5 of 7 sub-areas (6 in AK plus Russia) would have trends consistent with AK overall trend
- No 2 adjacent sub-areas would be declining
- No single sub-area would have declined by >50% (since 2000)
- Criteria reflect uncertainty regarding cause of initial steep decline in 1980s, continuing slower decline through 1990s, and uneven recovery in 2000s

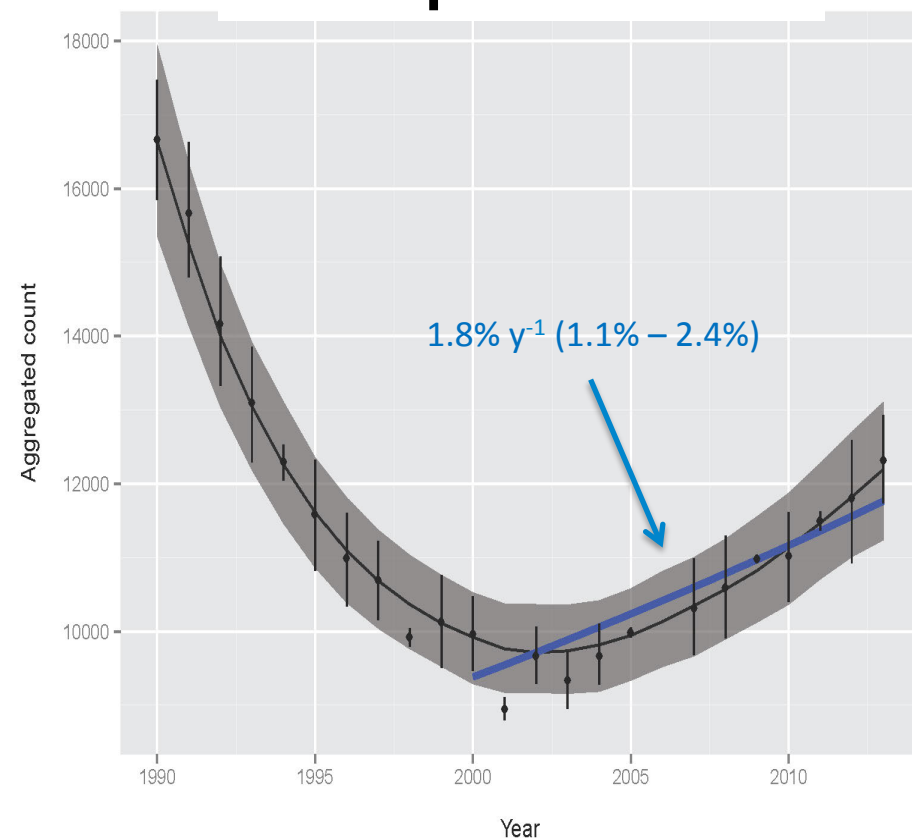
SSL Western DPS in Alaska

Rate of increase in 2000-2013 (\pm 95% CI)

Non-Pup Counts

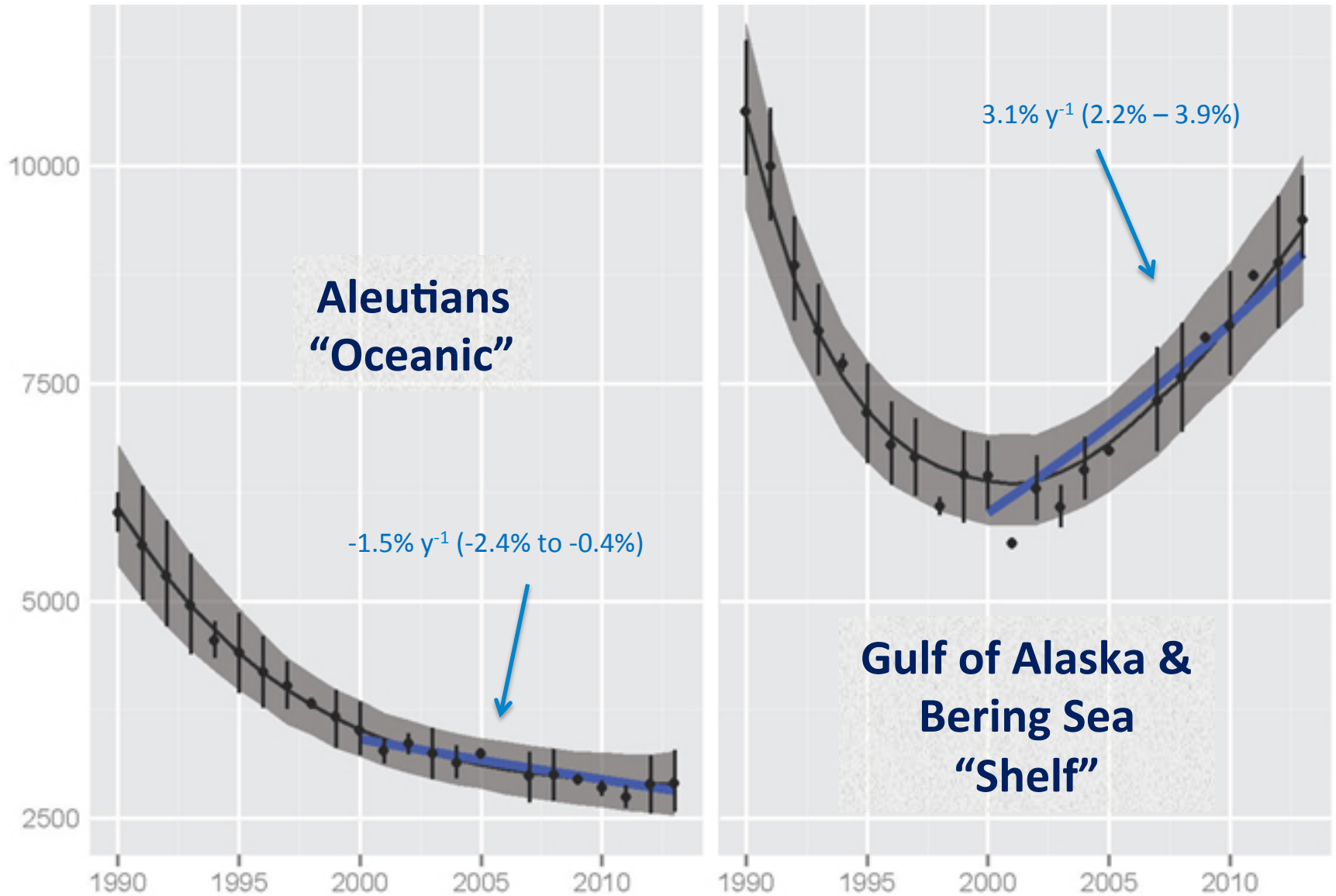


Pup Counts



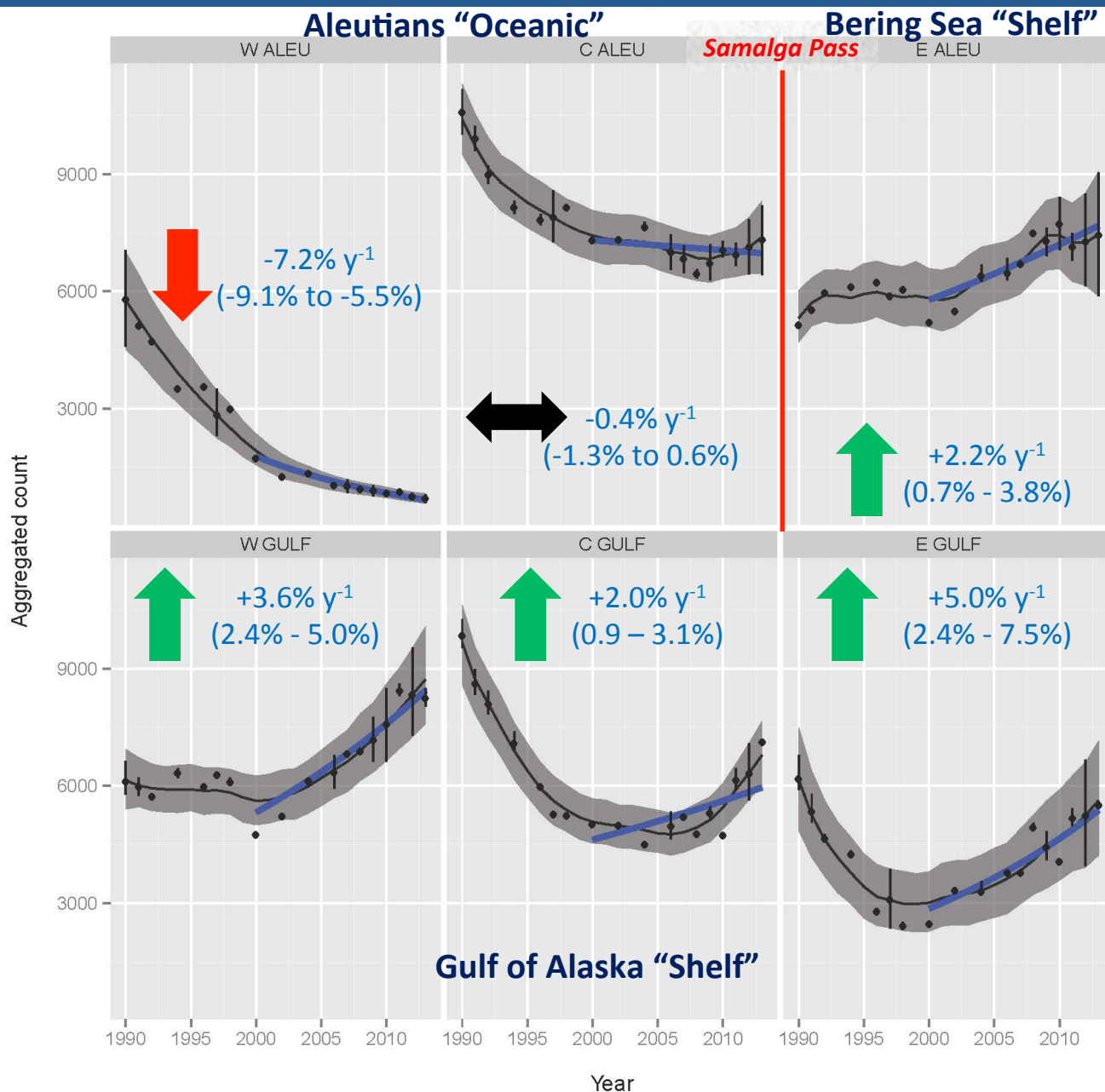
Steller Sea Lion Western DPS in Alaska (W & E of Samalga Pass)

2000-2013 Average Growth Rate – PUP COUNTS

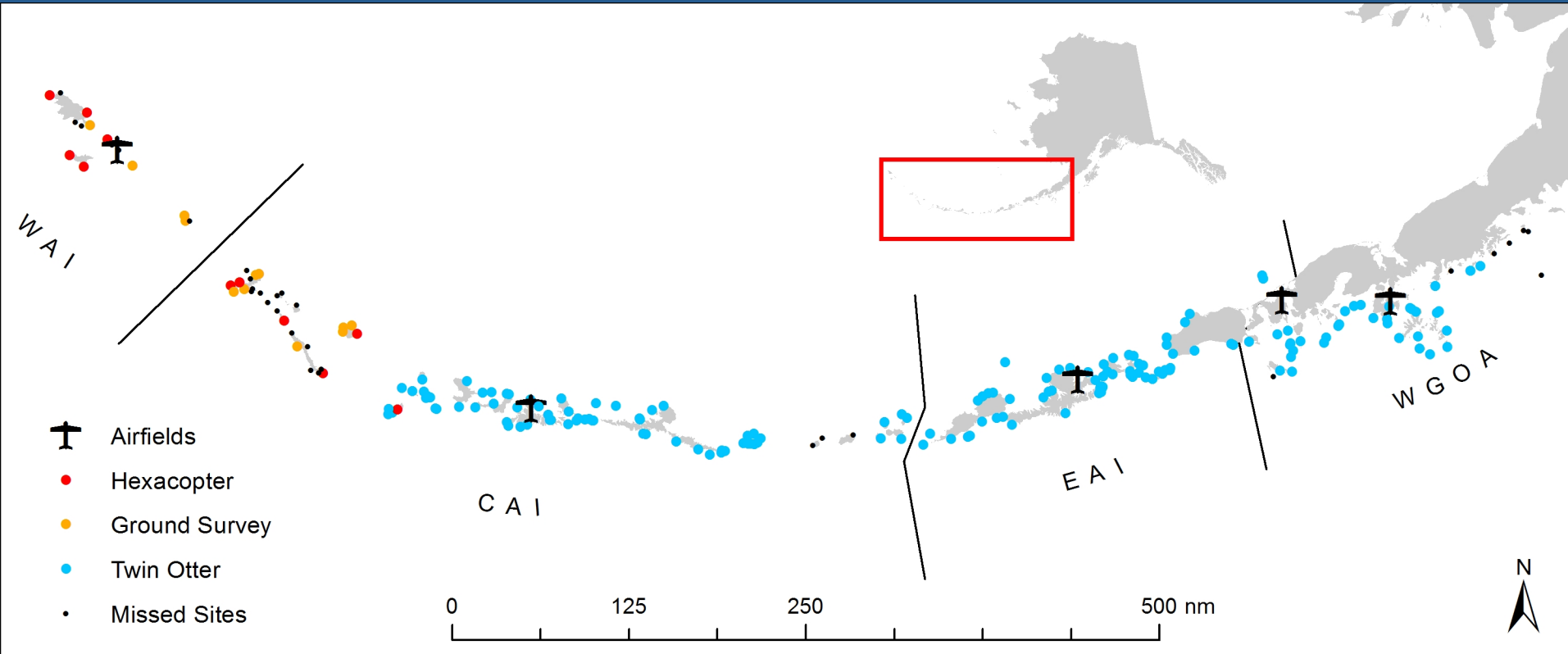


SSL Western DPS in Alaska – by ESA Sub-Area

2000-2013 Growth Rate – NON-PUP COUNTS



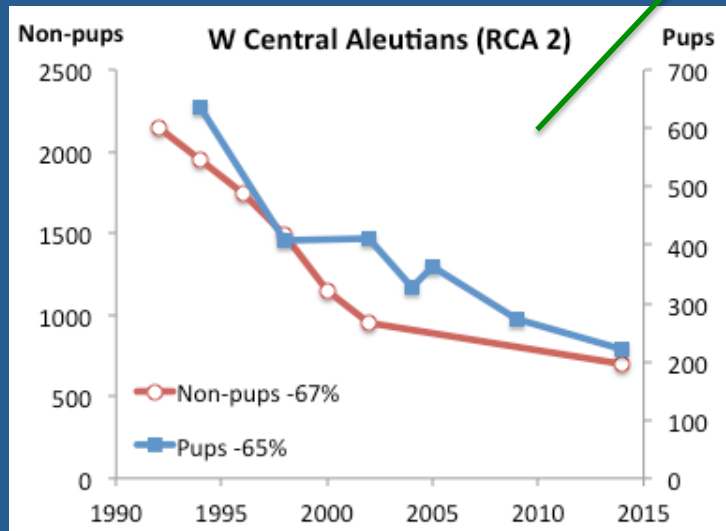
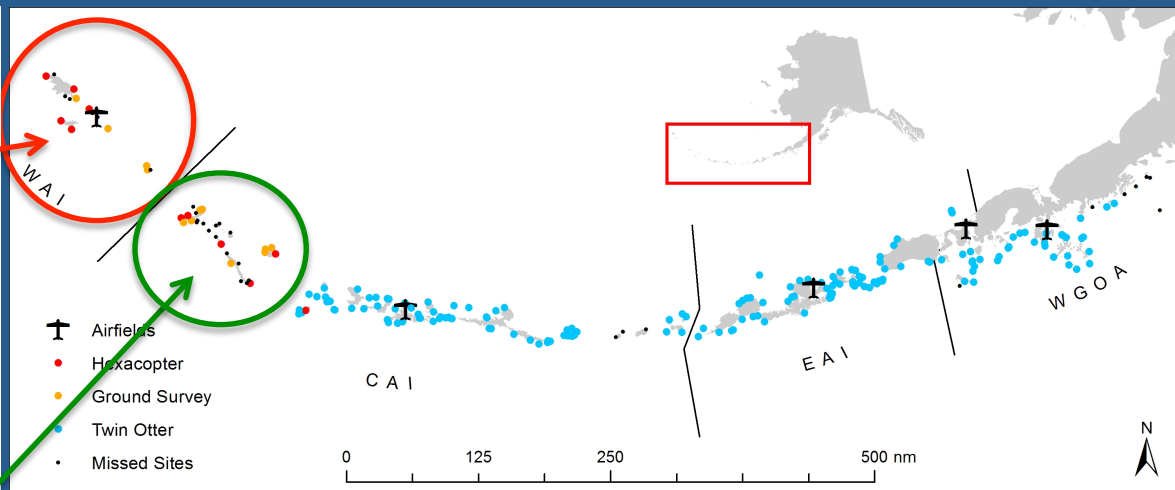
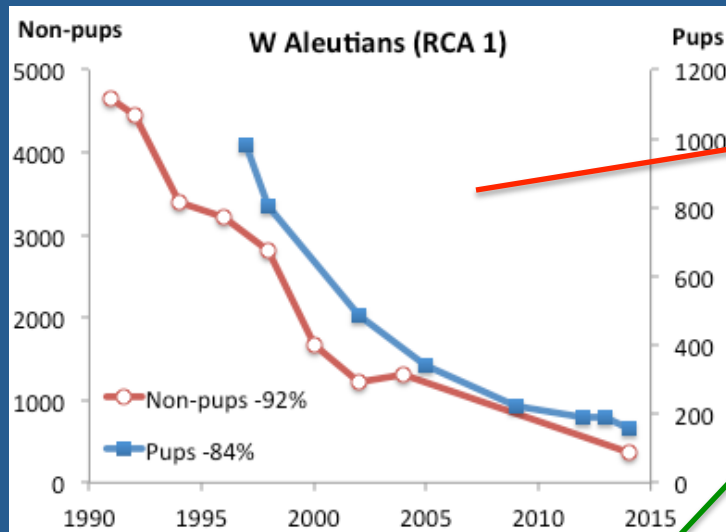
2014 Aleutian Steller Sea Lion Survey



- Three methods

- Twin Otter manned aircraft where airports were 'plentiful' ~200 sites
- Ship-based unmanned aircraft flown from shore 11 sites
- Ship-based visual counts (ground survey) 12 sites

Results for Western Aleutians (RCA 1) and RCA 2



- 2014 results complete and final
- Few SSLs expected at sites not surveyed in 2014
 - A total of 88 SSLs (0 pups) counted at these 18 sites in all 2006-2013 surveys combined, 61 at 1 site (Shemya)
- Continued declines in both RCAs 1 and 2 west of Amchitka Pass

'Stella' APH-22 Unmanned Aircraft used in 2014

- 4 lb Hexacopter
- Equipped with Canon EOS M digital camera
- Launched from shore
- Was used in Central and Western Aleutians



Cape Wrangell, Attu: June 2014



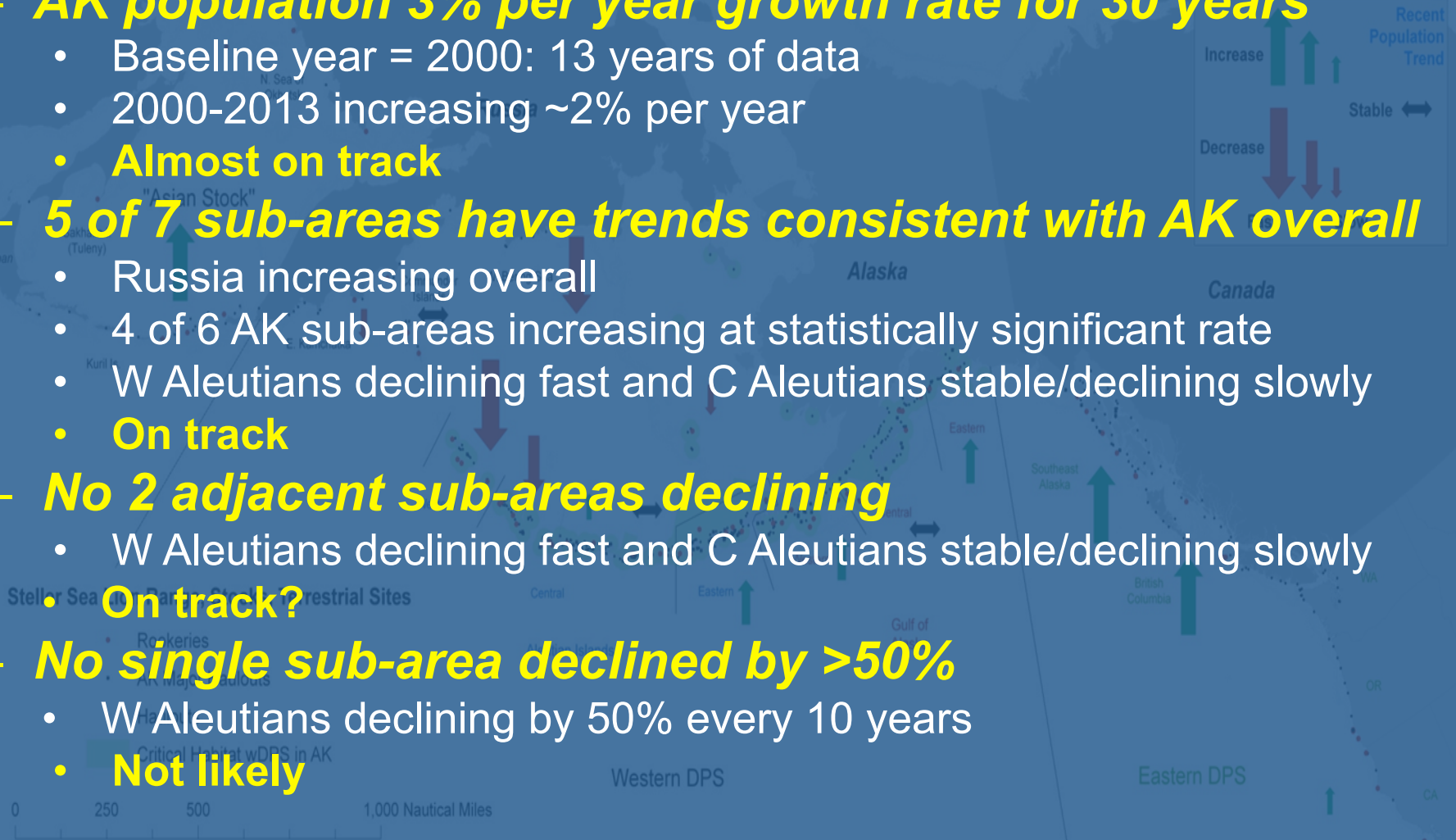
Right: Full single frame captured at an altitude of 200ft.

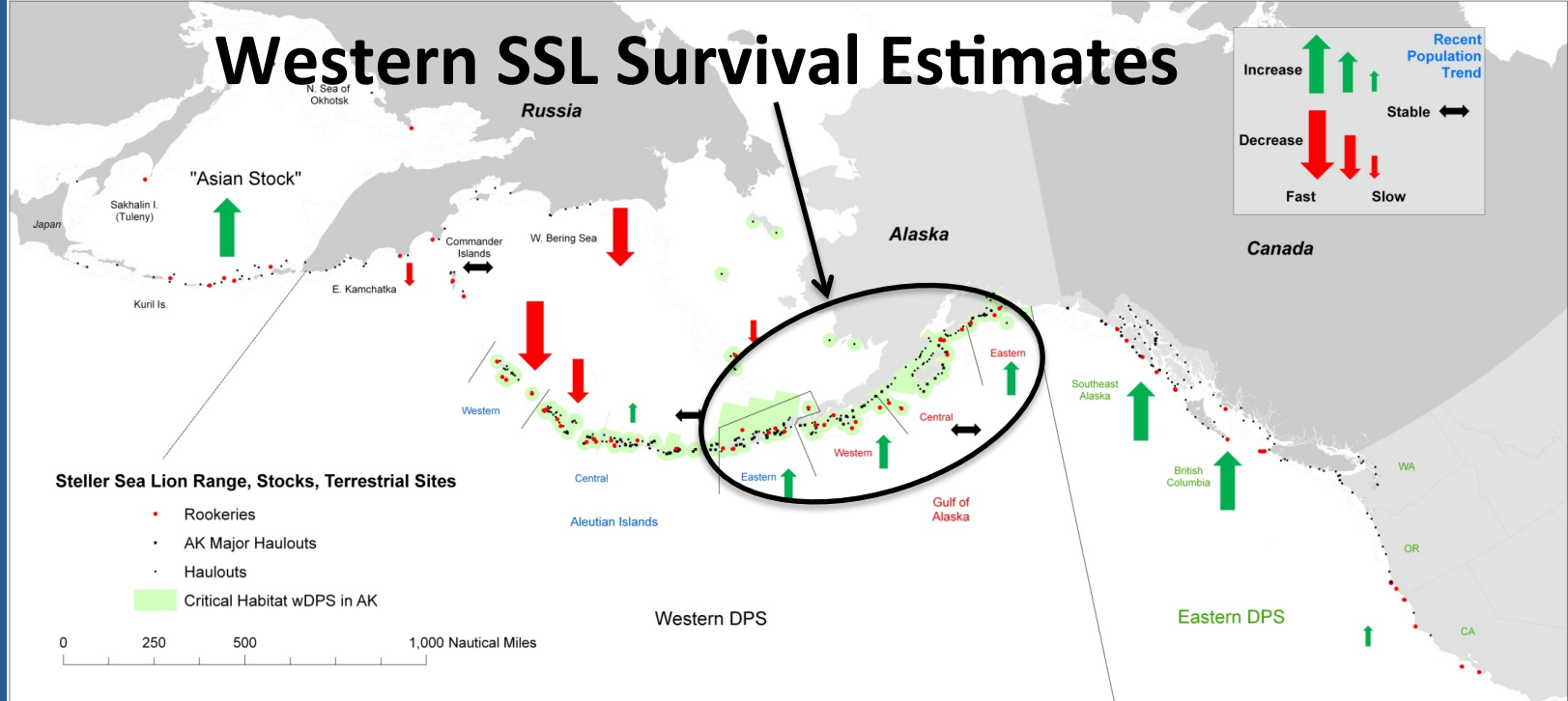
Left: Detail showing ~100, 1 year old branded at Gillon Point, Agattu I. rookery in June 2013

Steller sea lion Western DPS

Status relative to De-Listing Recovery Criteria

- **AK population 3% per year growth rate for 30 years**
 - Baseline year = 2000: 13 years of data
 - 2000-2013 increasing ~2% per year
 - **Almost on track**
- **5 of 7 sub-areas have trends consistent with AK overall**
 - Russia increasing overall
 - 4 of 6 AK sub-areas increasing at statistically significant rate
 - W Aleutians declining fast and C Aleutians stable/declining slowly
 - **On track**
- **No 2 adjacent sub-areas declining**
 - W Aleutians declining fast and C Aleutians stable/declining slowly
 - **On track?**
- **No single sub-area declined by >50%**
 - W Aleutians declining by 50% every 10 years
 - **Not likely**





- Eastern Aleutian Islands through Eastern Gulf of Alaska
 - E GULF (PWS): Fish Island and Seal Rocks
 - C GULF (Kodiak): Marmot and Sugarloaf
 - E ALEU (Unimak Pass): Ugamak
- **All results are for “Shelf” population East of Samalga Pass that has been increasing since 2000**

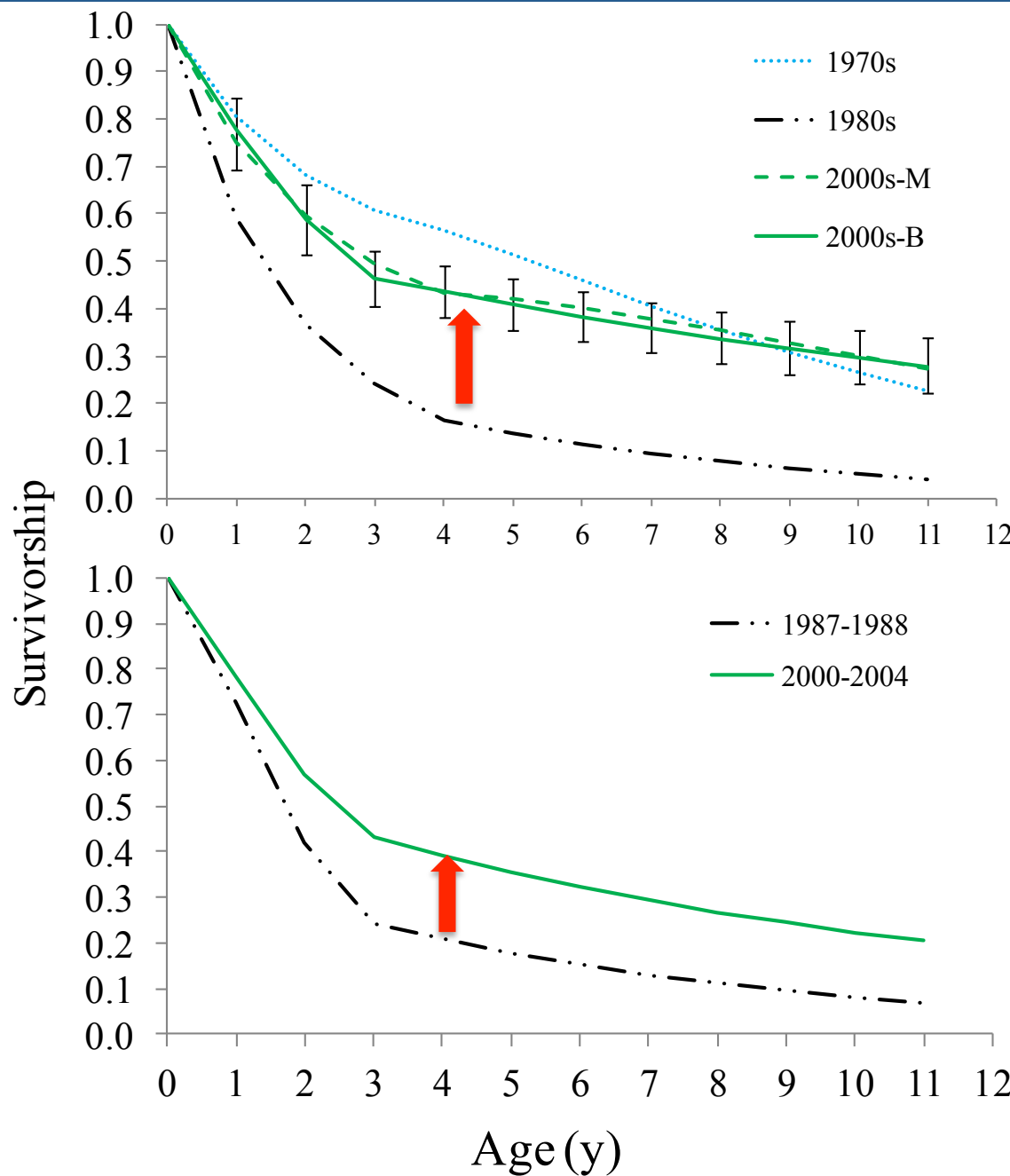
Decadal Changes in Survival

Low in 1980s

Improvement in 2000s

TOP: Females - Kodiak

- Holmes et al. 2007 model for 1970s, 1980s and 2000s (2000s-M)
- NMML branding data 2000s-B



BOTTOM: Sexes pooled - Kodiak

- Pup branding data only
- 1987-88 cohorts Pendleton et al. 2006
- 2000-2004 cohorts NMML in review

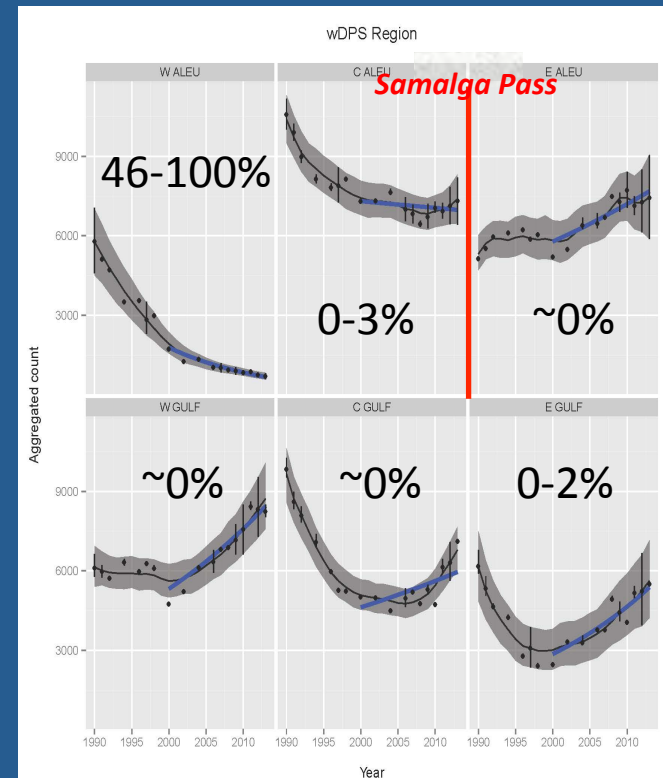
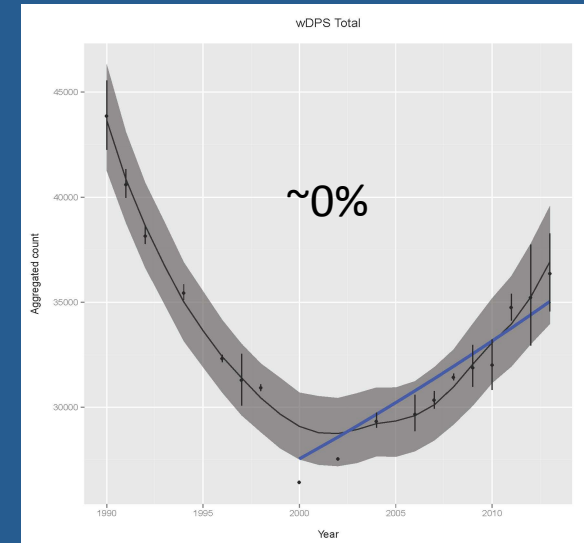
Survival in Western Aleutians

- June 2011: 54 branded on Agattu in W ALEU
- Between Jun '12-May '13, 27/54 observed
 - Minimum survival in year 1 = 50%
- Year 1 minimum S in W ALEU is greater than 2000-05 cohorts branded east of Samalga Pass where populations are increasing
 - Minimum survival in year 1 = 39% (9%-60%) for 2000-05

Probability of Extinction

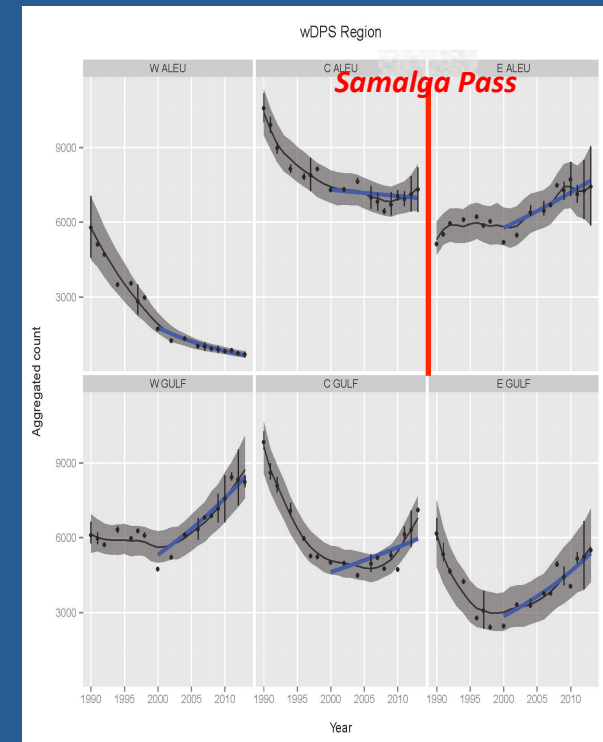
By Region and wDPS in AK overall

- Johnson 2013 'white paper' provided for 2014 BiOp
<http://alaskafisheries.noaa.gov/protectedresources/stellers/esa/biop/2014/analyses/johnson.pdf>
- Extinction risk in Western DPS in AK essentially 0 within the next 50 or 100 yr
- Extinction risk essentially 0 or very low in E Gulf, C Gulf, W Gulf, E Aleutians and C Aleutians
- Extinction risk very high in Western Aleutians, ranging between 46% and 100% depending on method within next 50 or 100 yr



Trends in Pup:Non-pup Ratios as an Index for Natality Changes

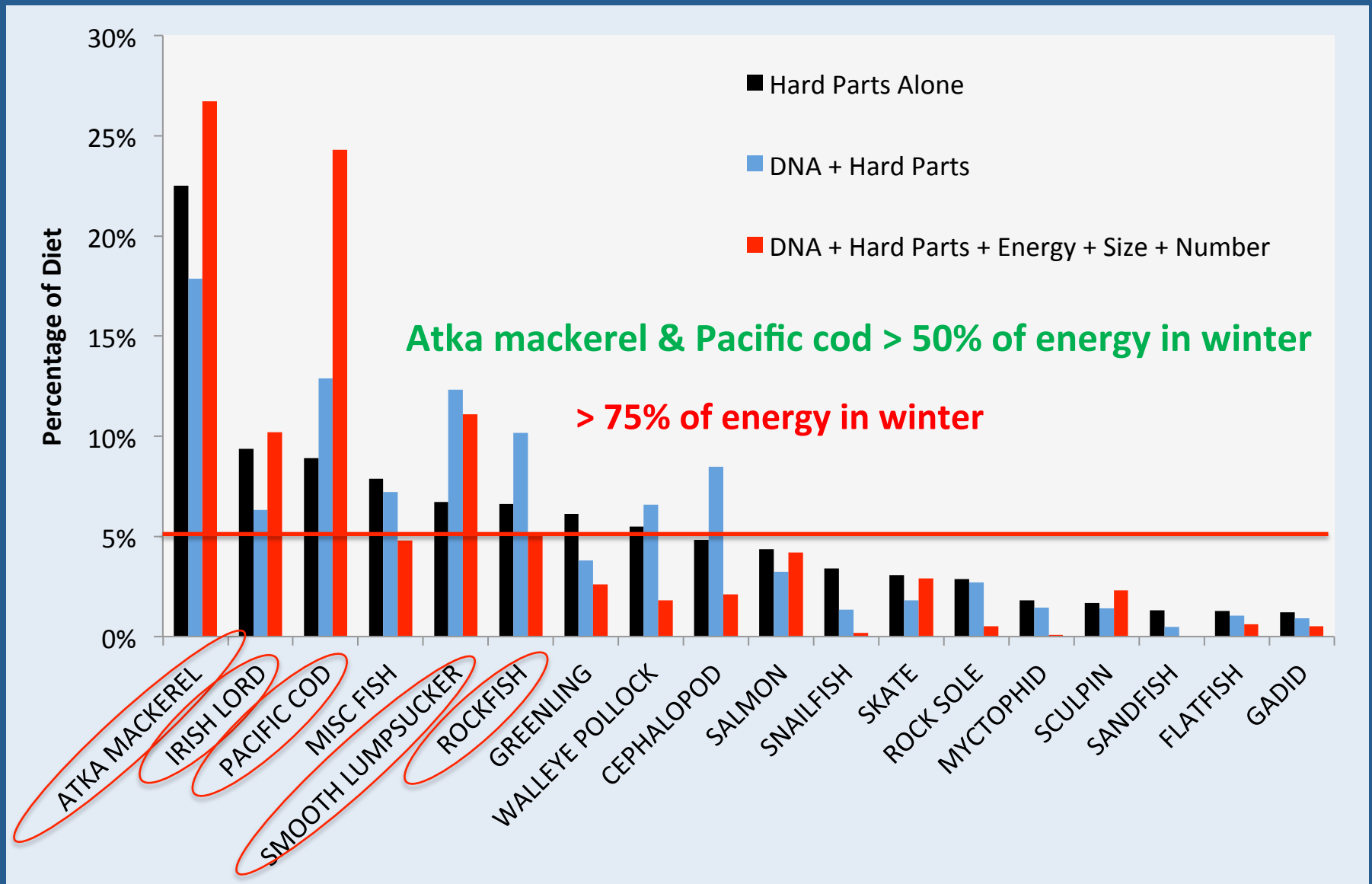
- Johnson and Fritz 2013 ‘white paper’ provided for 2014 BiOp
http://alaskafisheries.noaa.gov/protectedresources/stellers/esa/biop/2014/analyses/johnson_fritz.pdf
- “Overall, while the pup:np ratio is far from a perfect proxy for natality, under many situations, it works well” with caveats.
- In W Aleutians 1990-2013:
 - Both pup and non-pup counts declining
 - Pup counts declining faster than NP counts
 - Pup:NP ratio declining
 - Suggests that natality may also be declining
- Looked at 7 scenarios of vital rate changes to fit these count and ratio trends
- 6 of 7 scenarios tested involved a declining natality process
 - The one that didn’t had sharp drop in juvenile survival followed by an increase, which initially increased ratio of pups:NPs followed by decrease with no change in natality



Summary: Western SSL in AK

- 'Oceanic' population W of Samalga Pass
 - Continued decline in abundance through 2013
 - Through 2014, W of Amchitka Pass at a minimum
 - Initial indications are survival to age 1 not compromised
 - Direct mortality (e.g., predation) does not appear to be implicated at least very early in life
 - Modeling indicates potential for low natality contributing to decline
- 'Shelf' population E of Samalga Pass
 - Continued increase in abundance through 2013
 - Rebound in survival (and likely reproductive) rates to pre-decline levels
 - Predation does not appear to be slowing rebound here, nor did it affect recovery of eastern DPS

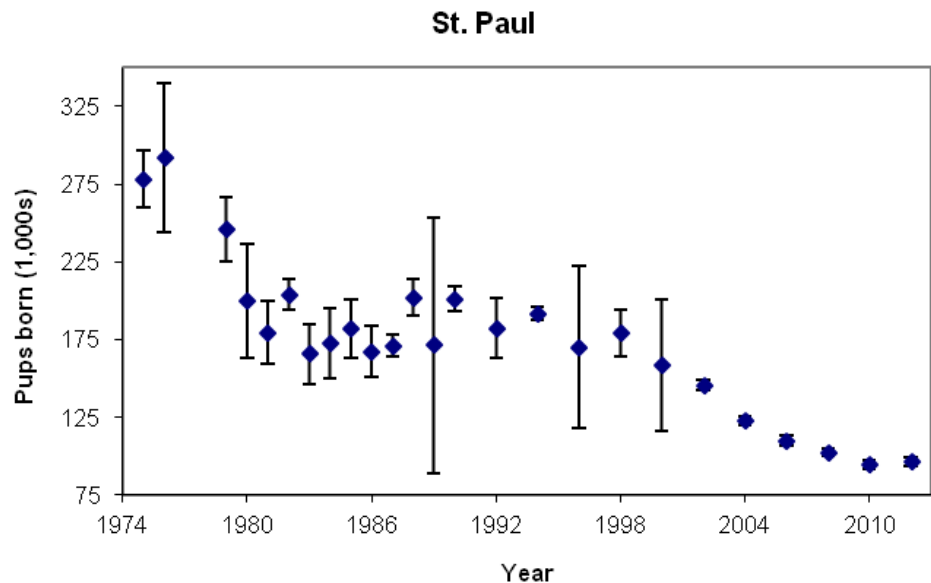
Winter Diet of Steller Sea Lions, Aleutian Islands, 2000-2012



Northern fur seal rookeries in United States



Pribilof Island Pup Production

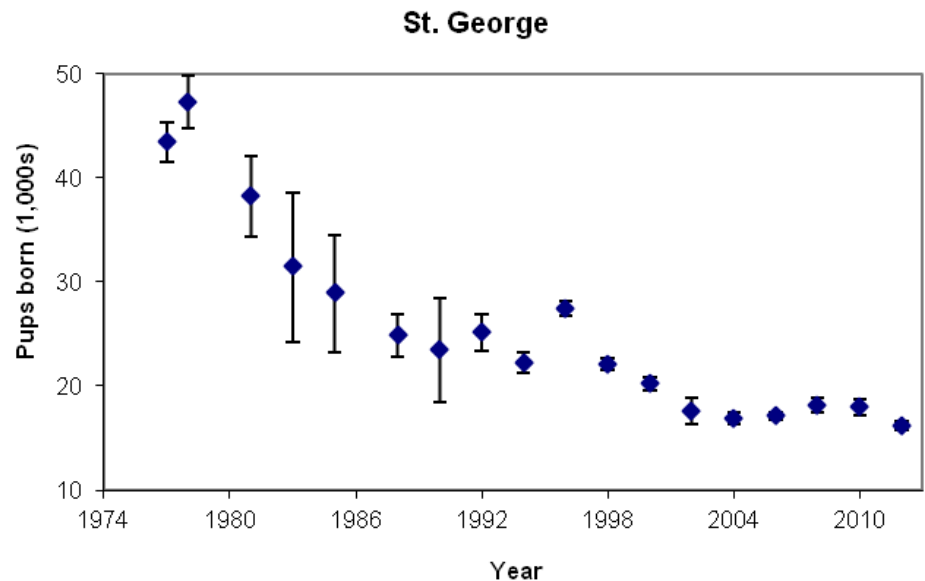


St. Paul 2012

$n = 96,828$ (se = 1,260)

1998-2012

Declining $4.84\% \text{ y}^{-1}$



St. George 2012

$N = 16,184$ (se = 155)

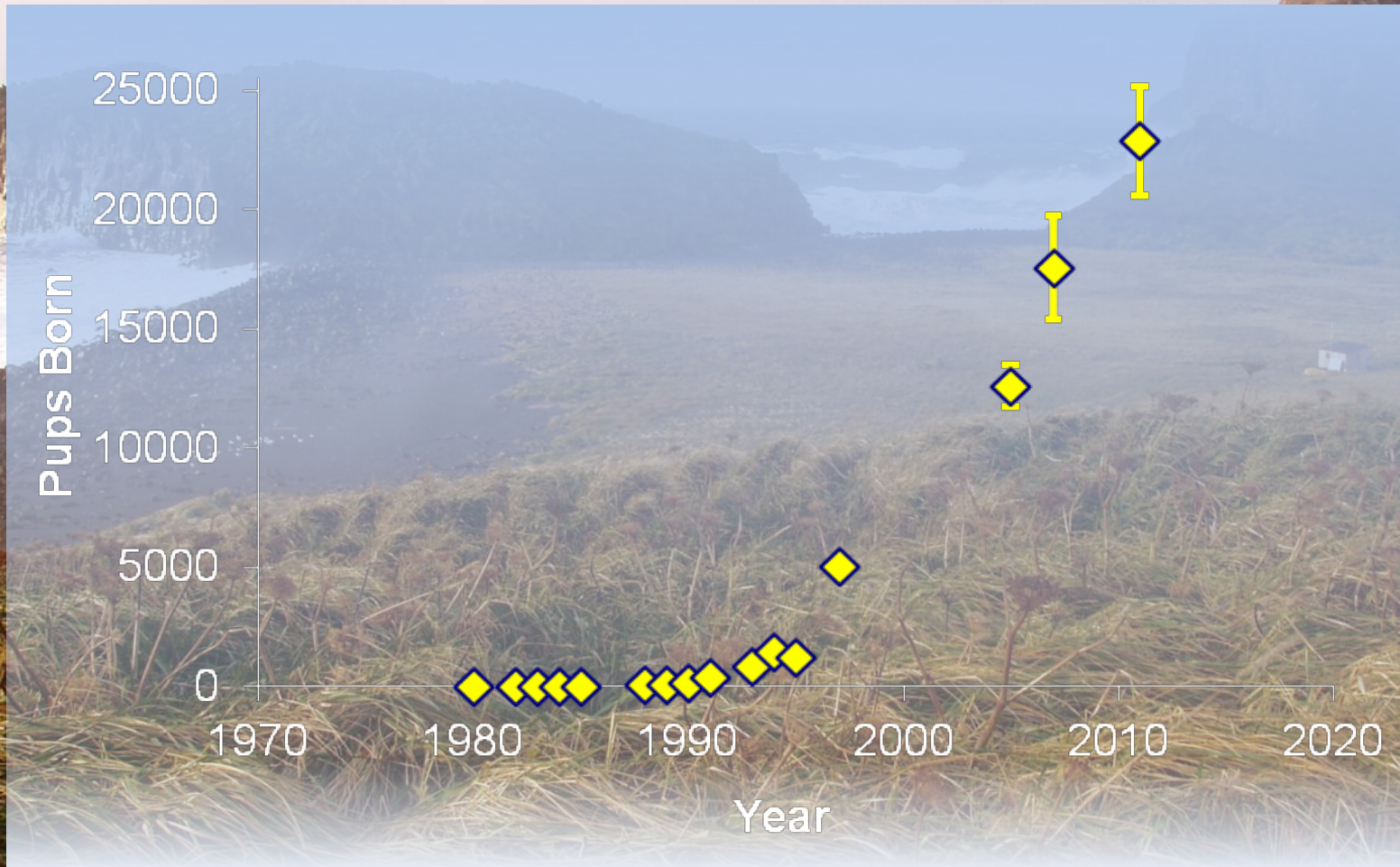
1998-2012

Declining $1.95\% \text{ y}^{-1}$

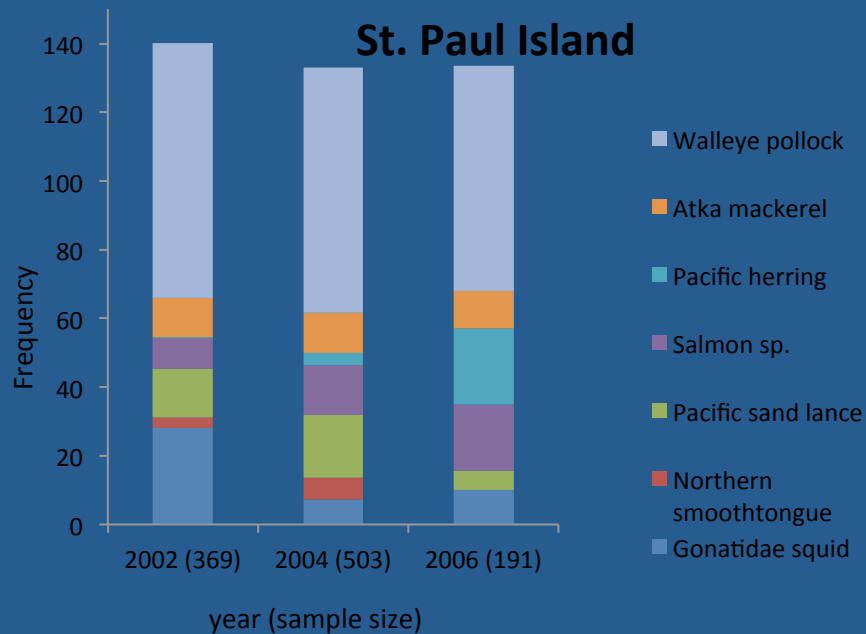
Bogoslof Island Pup Production

1997 – 2011 Increasing @ 12% y^{-1}

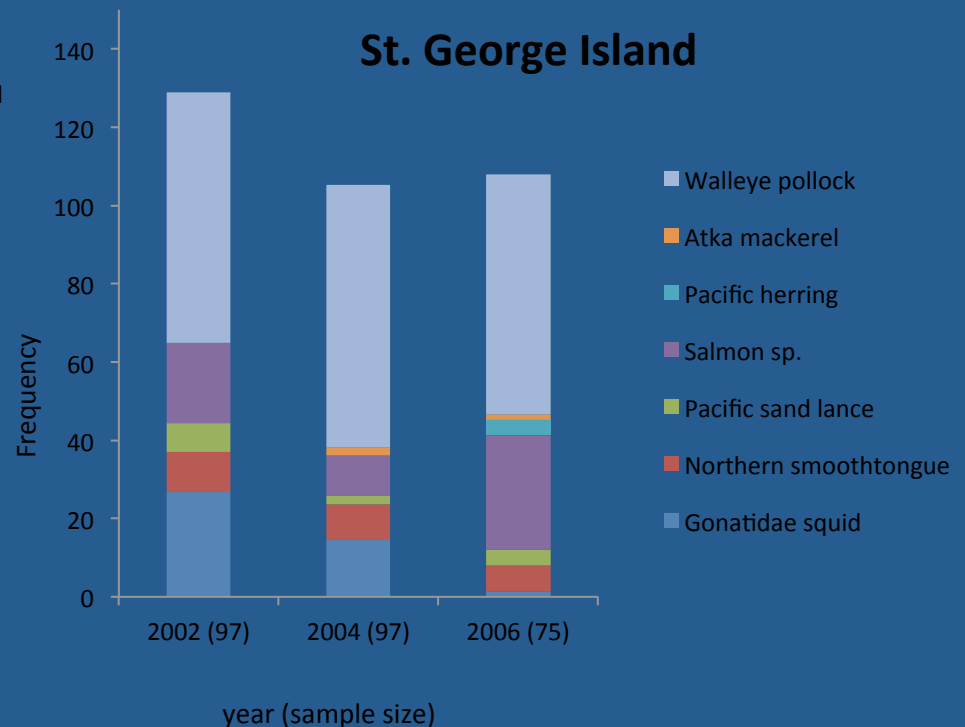
2011 production: $n = 22,905$ (se = 921.5)



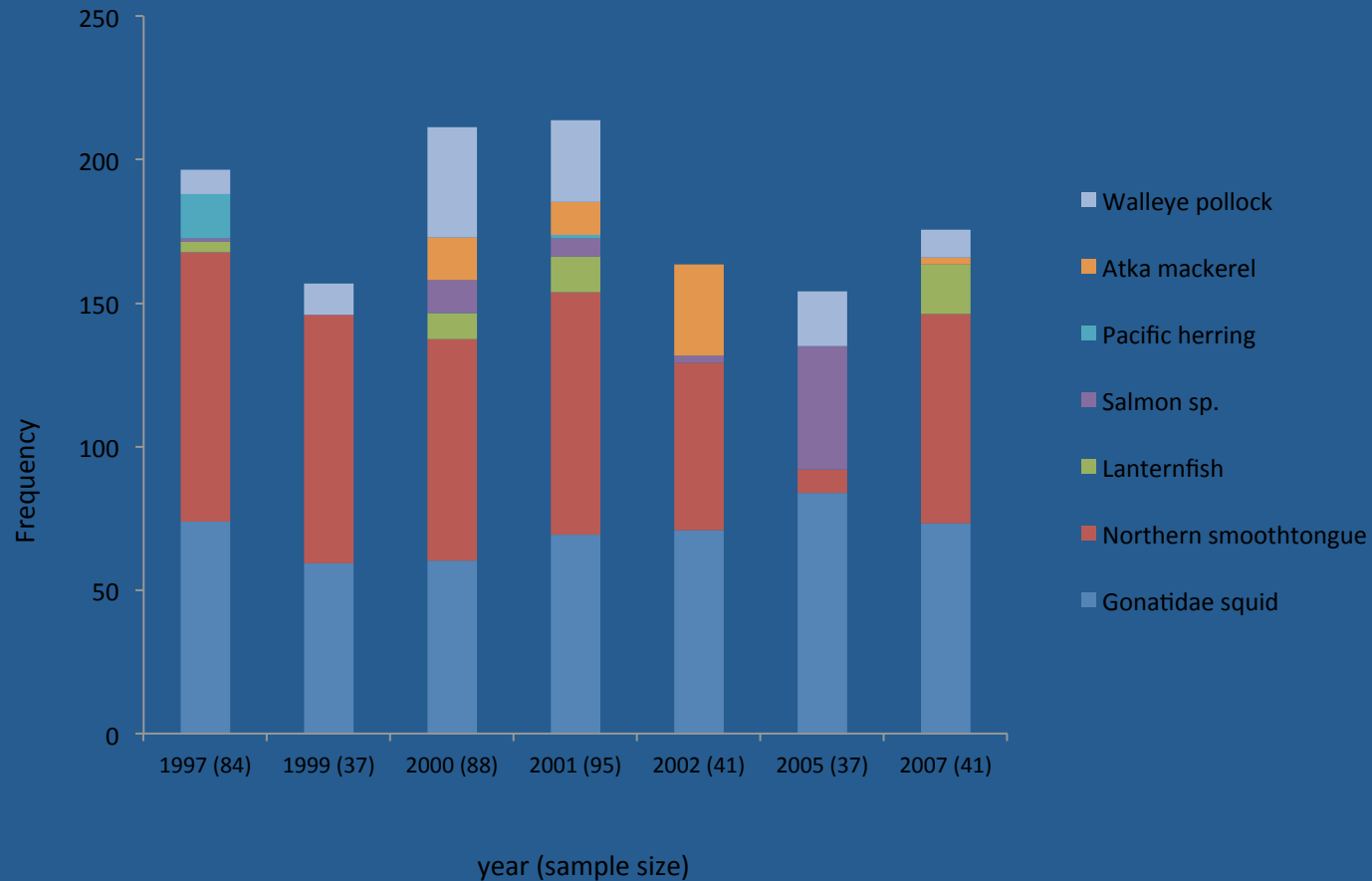
Top Prey of NFS on The Pribilof Islands



Rookery Samples Only



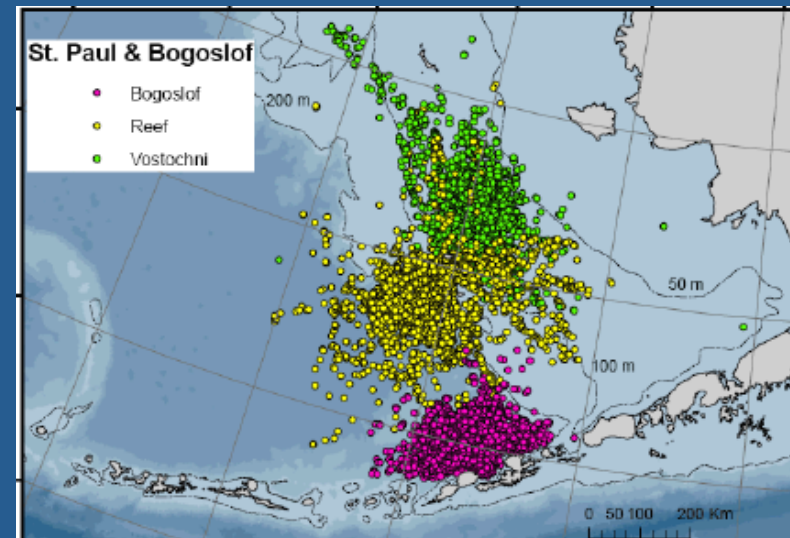
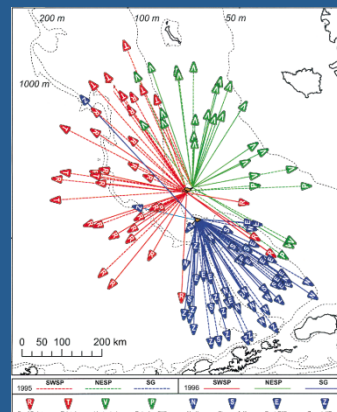
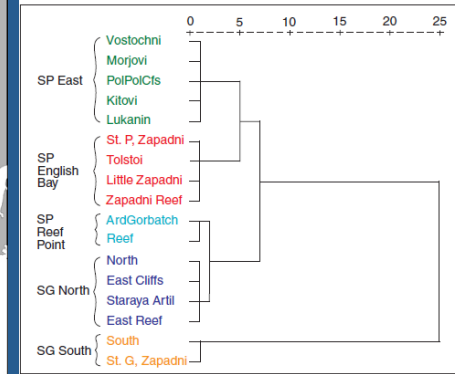
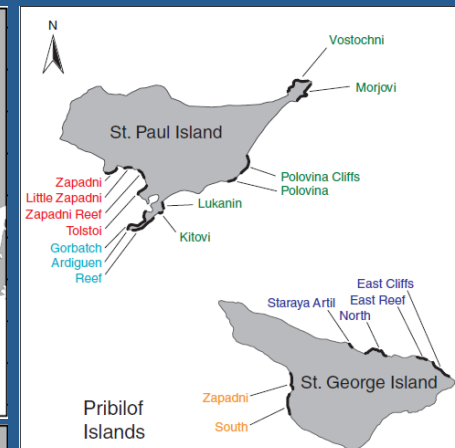
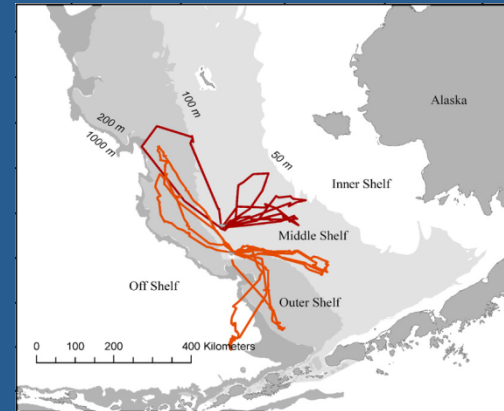
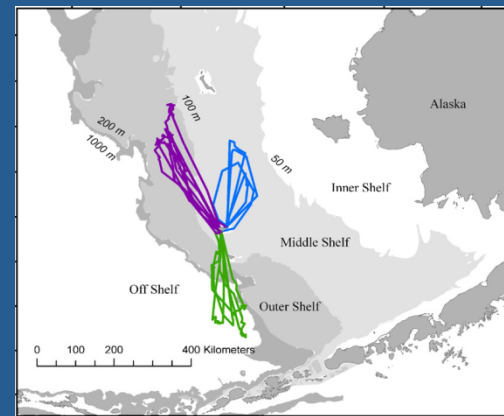
Top Prey of NFS on Bogoslof Island



Rookery and haul-out site samples

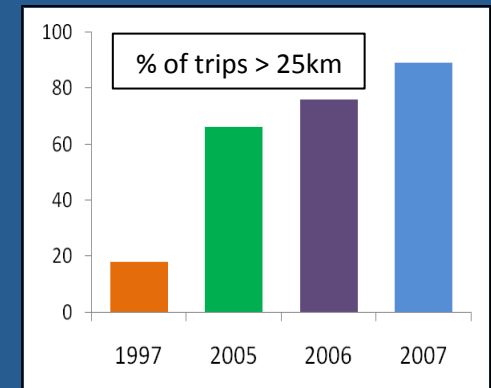
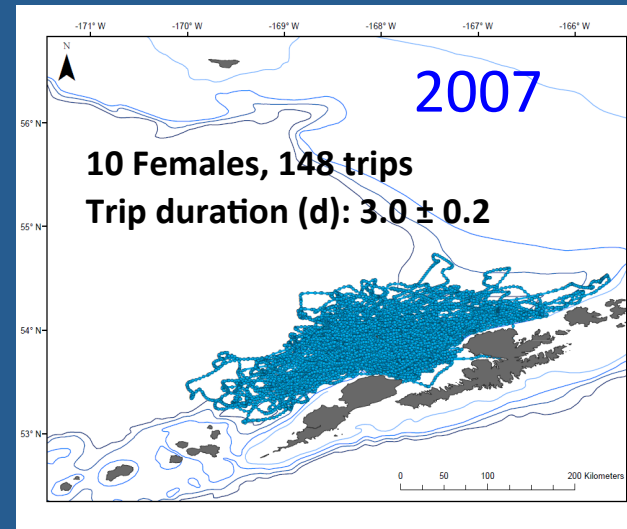
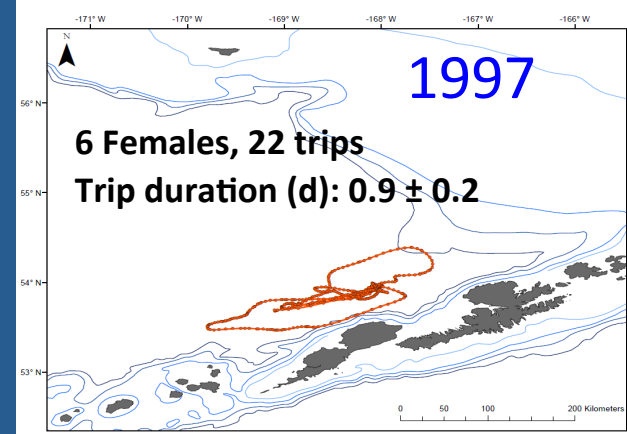
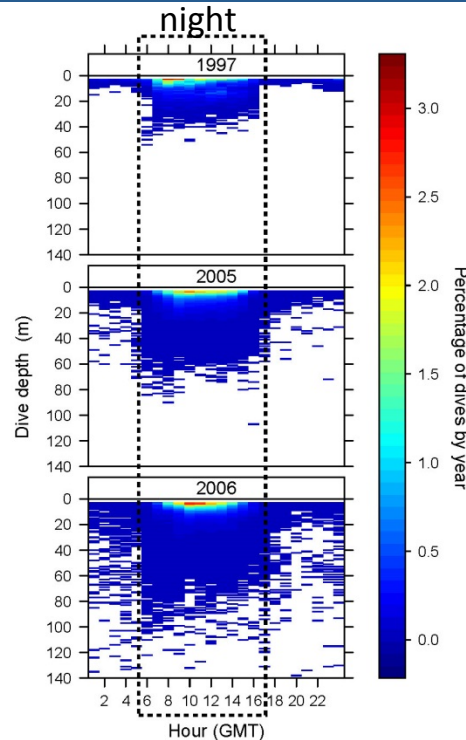
NFS Summer Foraging areas

- Adult females
- Separation of EBS foraging areas depending on rookery location
- Perhaps evolved to reduce intra-specific competition for prey



Changes in Foraging Ecology at Bogoslof as Population Increased

- Increases in trip durations, travel distances, average depth and overall foraging habitat
- Not 'pie-slice' separation like Pribilofs
- Very young rookery
- Similar to localized resource depletion reported for rapidly expanding sea bird colonies





Comparison between 'Oceanic' and 'Shelf'

2007 Data

Bogoslof
Oceanic
Increasing

St. Paul
Shelf
Decreasing

Max trip distance
(km)

90

320

Trip duration (d)

3.0

9.8

Time at sea

60%

77%

Population decline

-80%

Potential large drop in EBS
shelf carrying capacity

Summary for Steller sea lions and Northern fur seals

- Opposite trends for 'oceanic' and 'shelf' populations
- Steller sea lions
 - 'Oceanic' population W of Samalga Pass declining
 - 'Shelf' population E of Samalga pass increasing
- Northern fur seals
 - 'Oceanic' population on Bogoslof increasing
 - 'Shelf' population on Pribilofs declining
- Suggests that reasons for declines are more linked to complex interactions between species, seasonal use of habitats (including level of fisheries interactions), and differences in life histories and abundance than to simple regime (spatial or decadal) issues